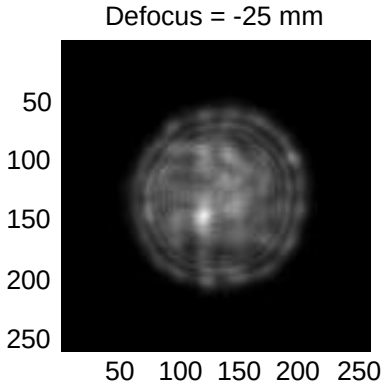
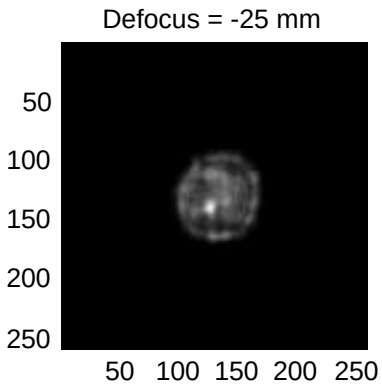
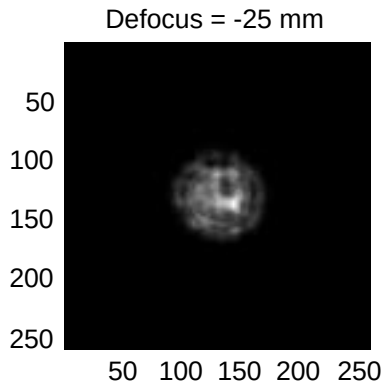
DCATT Source/Simulator/Camera First Light

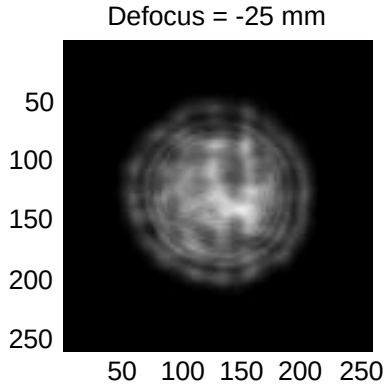
- DCATT telescope simulator module (TSM) was assembled and aligned to DCATT source module
  - Off-axis parabola
  - DM and aperture
  - Return mirror bypasses DM if selected
  - Phase plate filter wheel
- DCATT WF sensor camera was aligned to TSM
- DCATT control software was used to take first images and determine the wavefront error; results compared with Zygo interferometer measurements
  - Return mirror
  - DM
  - DM with actuators poked
- VSIM prescription retrieval code is being used to determine as-built prescription

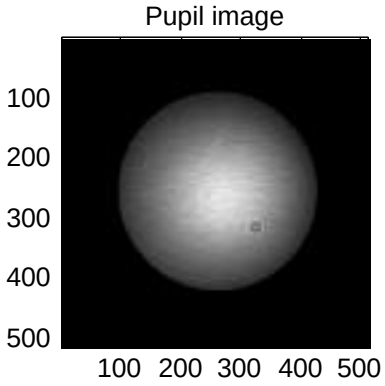
Typical Images









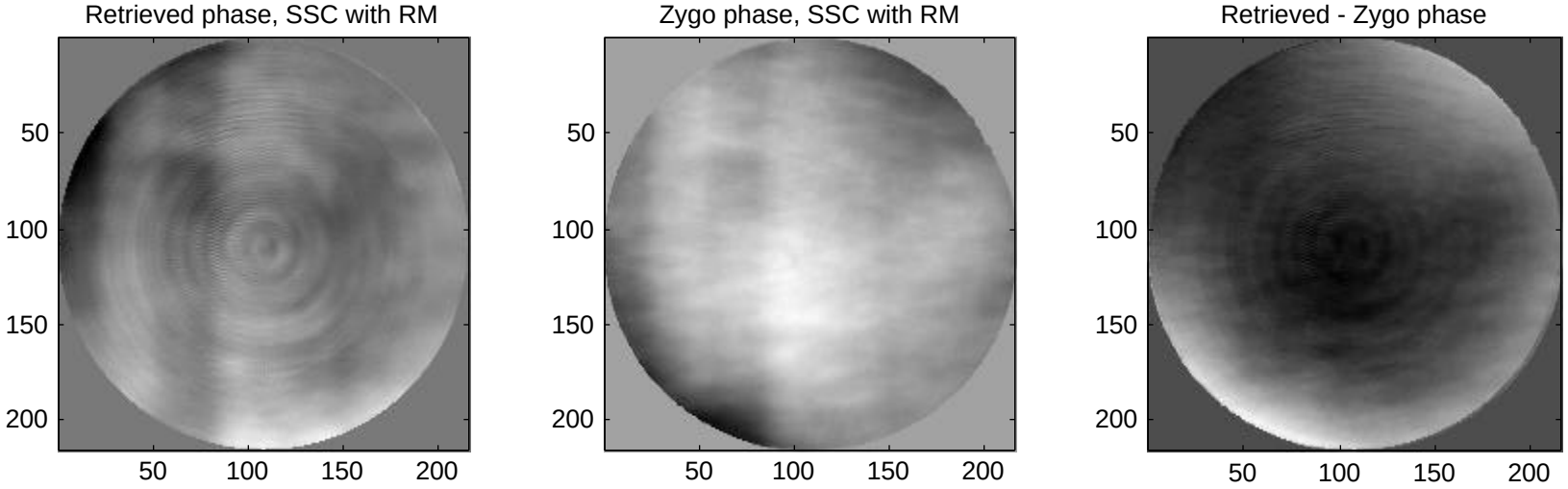


Pupil image
White light source
632.8±1.5nm filter
40 sec exposure

Shows slight offset,
taper at edge
Truncated gaussian profile

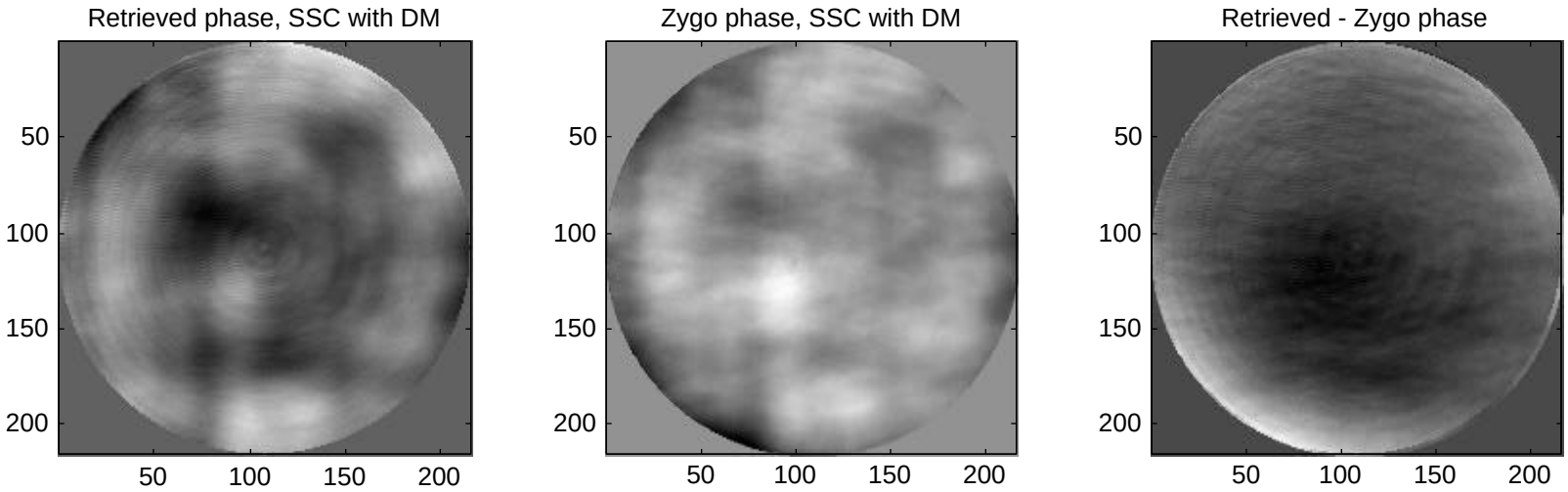
Defocussed images taken for WF sensing
Nominal defocus = --25, -12.5, 12.5 and 25 mm
DM actuators all at 1/8 max stroke
Images show stripes due to OAP figure errors, astigmatism, DM actuator features

WF Sensing Results: Return Mirror



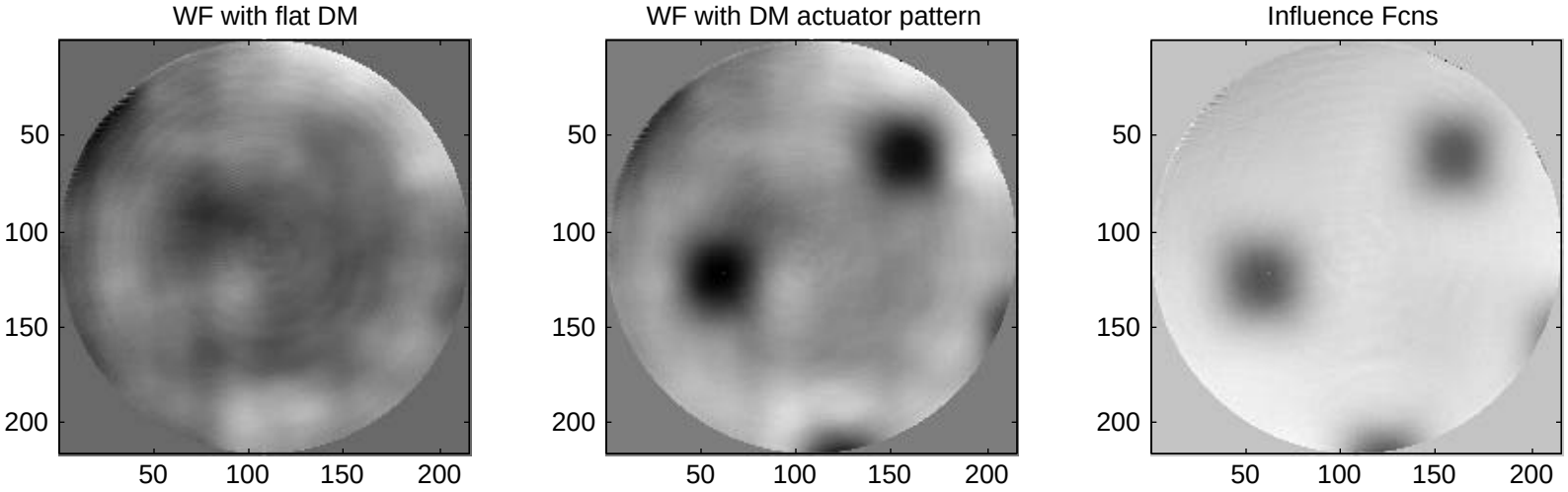
- WFS results show gouges in OAP from figuring and polishing during OAP manufacture
  - Consistent in both measurements, removed in difference frame
- Zygo measurement shows bump, focus, astigmatism missing in WFS results
  - Non-common path (DCATT BS, interferometer optics)
  - Zygo measurements noisy, differences from frame to frame up to 0.1 wave
- WFS results show ring artifacts
  - Will update parameters with as-built numbers

WF Sensing Results: Deformable Mirror



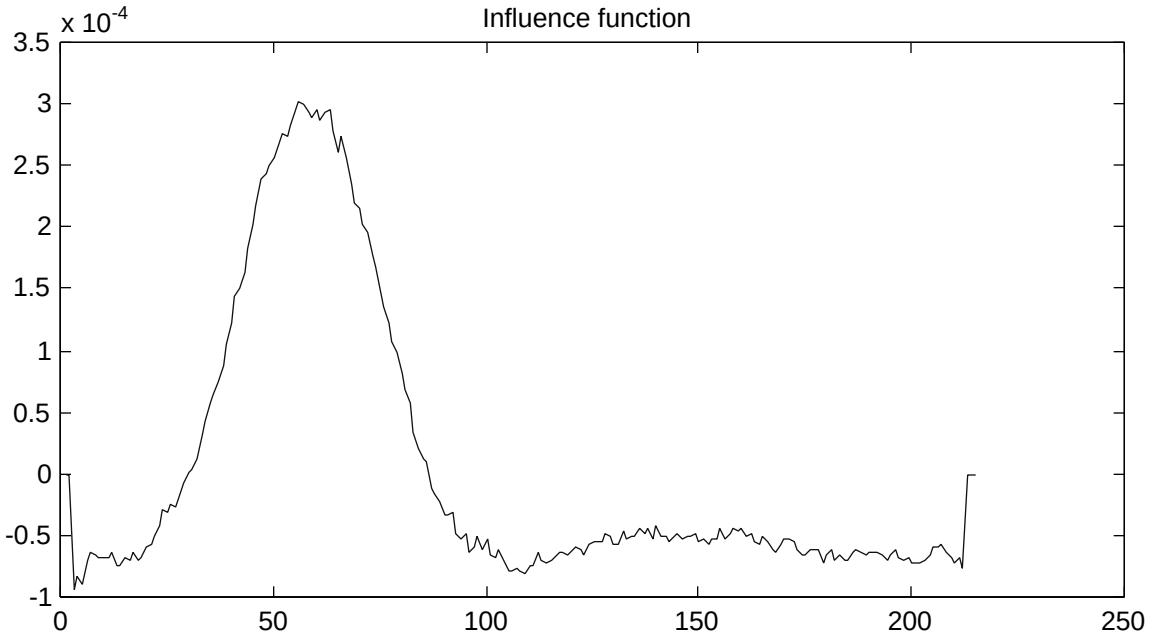
- WFS results show OAP gouges and DM actuator residuals
  - Consistent in both measurements, removed in difference frame
- Zygo measurement shows bump, focus, astigmatism missing in WFS results
  - Non-common path (DCATT BS, interferometer optics)
  - Zygo measurements noisy, differences from frame to frame to 0.1 wave
- WFS results show ring artifacts
  - Will update parameters with as-built numbers

WF Sensing: DM Calibration



- Flat taken with each DM actuator commanded to 128*63/4096
- Next frame shows WF after 4 actuators increasedto 255*63/4096
- Difference frame removes common structure
  - OAP gouges
  - DM residuals
- Will be repeated for all actuators to develop control matrices
- Next step: closed-loop DM control

DM Influence Function



- Slice across actuator pattern from WF shown on previous slide
- Shows typical DM actuator structure
- Shows large influence